

AMENDMENTS TO THE CLAIMS:

Please replace the claims with the claims provided in the listing below wherein status, amendments, additions and cancellations are indicated.

1. (Currently Amended) A multi-signal analyzer for analyzing an engine,
the analyzer providing data for an engine control unit to control engine
performance, comprising:

an AD converter for simultaneously receiving a plurality of time series signals representing physical and chemical phenomena pertaining to the engine and subjecting the signals to AD conversion;

a delay time calculation unit for calculating ~~[[the]]~~ delay time between an arbitrary two time series signals from among the plurality of time series signals input to the AD converter;

a time axis adjustment unit for advancing or delaying ~~[[the]]~~ a time axis of one signal of the arbitrary two time series signals according to the delay time calculated by the delay time calculation unit, to thereby ~~[[make]]~~ correlate the two time series signals to ~~[[have]]~~ the same time axis; and

a data analyzer for performing analysis such as determining a mutual correlation coefficient by comparing the two time series signals made to have the same time axis,

wherein the plurality of time series signals comprise signals which represent an engine fuel flow rate having a transient state, an amount of generated torque, an engine rotation speed, and an exhaust gas amount,

wherein the plurality of time series signals include at least one time series signal that has at least a 10 second delay time relative to another of the plurality of time series signals, and

wherein the delay time calculation unit performs one of either:

finding a time point when a mutual correlation coefficient of each of the arbitrary two time series signals is maximum, wherein said time point is set as the delay time, or

obtaining an impulse response output representing the correlation coefficient of the two time series signals, wherein peak impulse response output is set as the delay time.

2. (Currently Amended) A multi-signal analyzer according to claim 1, wherein the delay time calculation unit comprises:

a delay time generation unit for applying a delay time to one signal of the two arbitrary time series signals;

a correlation calculation unit for performing an integration processing after the one signal delayed by the delay time generation unit is multiplied by the other signal of the arbitrary two time series signals, to thereby determine a mutual

correlation function representing a degree of similarity between the two signals;
and

a delay time controller for controlling the delay time in such a way that the value of the mutual correlation function is maximized, to thereby ~~[[setting]]~~ set the delay time τ at such an instance to be the delay time between the two signals.

3. (Currently Amended) A multi-signal analyzer according to claim 1, wherein the delay time calculation unit comprises:

an FFT calculation unit for subjecting each of the two arbitrary time series signals to a Fourier Transformation processing for transforming a time function to a frequency function; and

an impulse response calculation unit for performing an averaging processing after multiplying ~~[[the]]~~ a conjugate complex number of ~~[[the]]~~ one signal of the two arbitrary time series signals subjected to the Fourier Transformation processing by the other signal, to thereby obtain an impulse response output representing a degree of correlation between the two signals;

wherein setting a time at which the value of the impulse response output reaches a peak as the delay time between the two signals.

4. (Original) A multi-signal analyzer according to any of claims 1 to 3, wherein the time axis adjustment unit makes the other signal of the signals input

to the AD converter to have the same time axis using the time axis of a selected one signal of the signals as a reference.

5. (Currently amended) A multi-signal analyzer according to any of claims 1 to 3, wherein the plurality of time series signals ~~are signals including include multiple signals having a steady state, and at least one of the time series signals has a delay time of 10 seconds or more as compared with the other signal.~~

6. (Currently amended) A multi-signal analyzer according to any of claims 1 to 3, wherein ~~the time series signals include at least the fuel flow rate, the number of generated torques, the speed, and the amount of exhaust gas of an automobile engine, and a result of analysis of the data analyzer is used to ECU control of the engine.~~ a time axis for a reference one signal among the plurality of time series signals serves as a reference time axis for correlating all other signals of the plurality of time series signals, and wherein time delays are determined for each of said all other time series signals relative to said reference time axis for subsequent engine control processing.